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Lake Verret
Assumption Parish, Louisiana

National Eutrophication Survey, Las Vegas, Nev

Prepared for

Environmental Monitoring and Support Lab, Las Vegas, Nev

Mar 77

PB 269 469

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NATIONAL EUTROPHICATION SURVEY
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16. ABSTRACT

Annual total phosphorus and total nitrogen loadings to the lake were estimated and subdivided according to either point or non-point source origin. An assessment of the lake's trophic condition and limiting nutrient is also provided. All data collected by the U.S.E.P.A. National Eutrophication Survey during the one year study of the lake and its tributaries are included in the report.

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REPORT

ON

LAKE VERRET

ASSUMPTION PARISH

LOUISIANA

EPA REGION VI

WORKING PAPER NO. 594

WITH THE COOPERATION OF THE

LOUISIANA WILD LIFE AND FISHERIES COMMISSION

AND THE

LOUISIANA NATIONAL GUARD

MARCH, 1977

REPORT ON LAKE VERRET

ASSUMPTION PARISH, LOUISIANA

EPA REGION VI

by

National Eutrophication Survey

Water and Land Quality Branch
Monitoring Operations Division
Environmental Monitoring & Support Laboratory
Las Vegas, Nevada

and

Special Studies Branch
Corvallis Environmental Research Laboratory
Corvallis, Oregon

Working Paper No. 544

OFFICE OF RESEARCH AND DEVELOPMENT
U.S. ENVIRONMENTAL PROTECTION AGENCY

March 1977

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FOREWORD

The National Eutrophication Survey was initiated in 1972 in response to an Administration commitment to investigate the nationwide threat of accelerated eutrophication to freshwater lakes and reservoirs.

OBJECTIVES

The Survey was designed to develop, in conjunction with state environmental agencies, information on nutrient sources, concentrations, and impact on selected freshwater lakes as a basis for formulating comprehensive and coordinated national, regional, and state management practices relating to point source discharge reduction and nonpoint source pollution abatement in lake watersheds.

ANALYTIC APPROACH

The mathematical and statistical procedures selected for the Survey's eutrophication analysis are based on related concepts that:

a. A generalized representation or model relating sources, concentrations, and impacts can be constructed.

b. By applying measurements of relevant parameters associated with lake degradation, the generalized model can be transformed into an operational representation of a lake, its drainage basin, and related nutrients.

c. With such a transformation, an assessment of the potential for eutrophication control can be made.

LAKE ANALYSIS

In this report, the first stage of evaluation of lake and watershed data collected from the study lake and its drainage basin is documented. The report is formatted to provide state environmental agencies with specific information for basin planning [§303(e)], water quality criteria/standards review [§303(c)], clean lakes [§314(a,b)], and water quality monitoring [§106 and §305(b)] activities mandated by the Federal Water Pollution Control Act Amendments of 1972.

Beyond the single lake analysis, broader based correlations between nutrient concentrations (and loading) and trophic condition are being made to advance the rationale and data base for refinement of nutrient water quality criteria for the Nation's freshwater lakes. Likewise, multivariate evaluations for the relationships between land use, nutrient export, and trophic condition, by lake class or use, are being developed to assist in the formulation of planning guidelines and policies by the U.S. Environmental Protection Agency and to augment plans implementation by the states.

ACKNOWLEDGMENTS

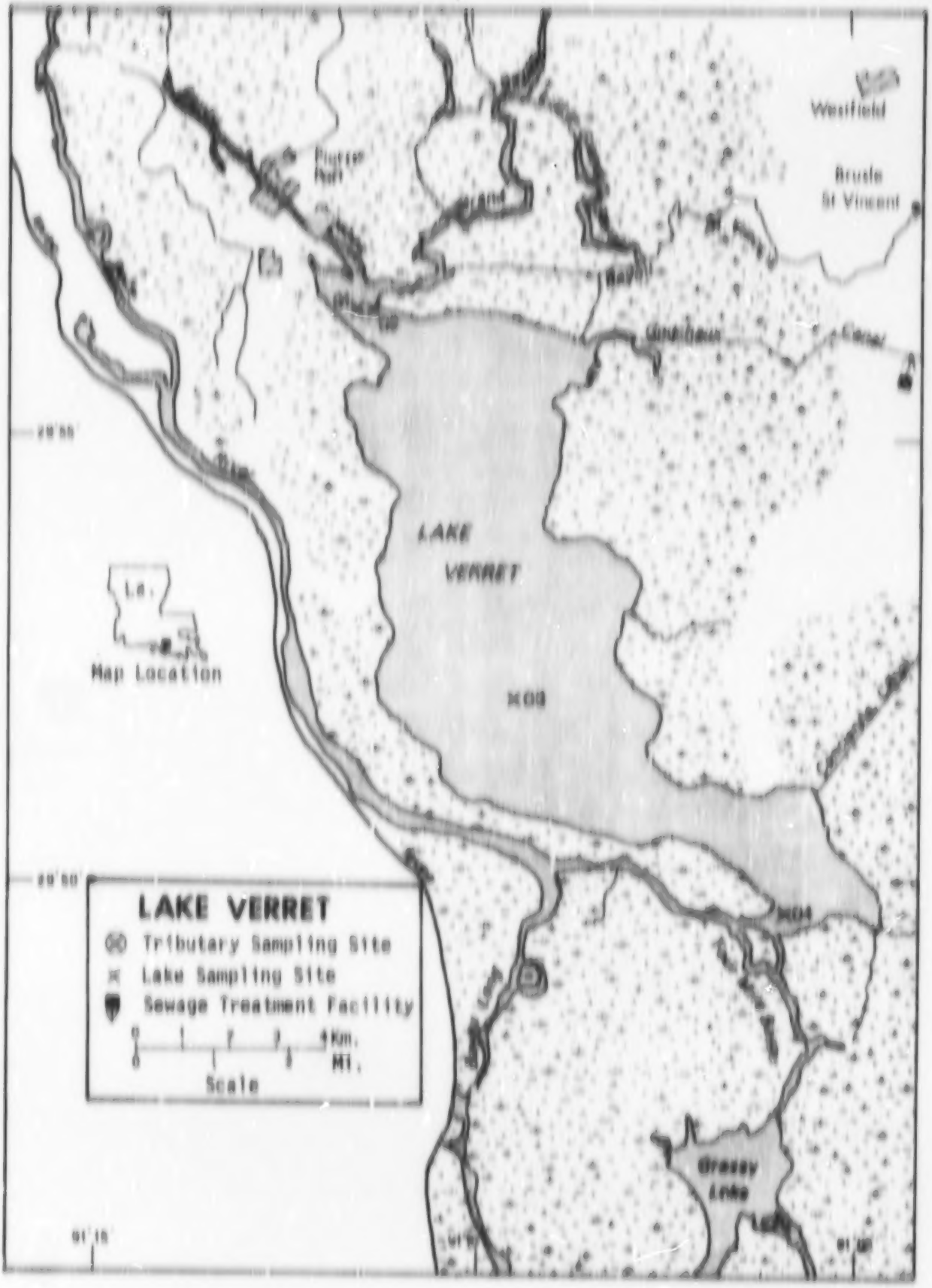
The staff of the National Eutrophication Survey (Office of Research and Development, U.S. Environmental Protection Agency) expresses sincere appreciation to the Louisiana Wild Life and Fisheries Commission, Division of Water Pollution Control for professional involvement, to the Louisiana National Guard for conducting the tributary sampling phase of the Survey, and to those Louisiana wastewater treatment plant operators who provided effluent samples and flow data.

Robert A. Lafleur, Chief; J. Dale Givens, Assistant Chief; Lewis R. Still, Biologist; Louis Johnson, Biologist; Lee Caubarreaux, Biologist; Garrell Reed, Engineer; Dempsey Alford, Biologist; and Elwood Goodwin, Water Quality Control Technician, all of the Louisiana Wild Life and Fisheries Commission, Division of Water Pollution Control reviewed the preliminary reports and provided critiques most useful in the preparation of this Working Paper Series.

Major General O'Neil Daigle, Jr., the Adjutant General of Louisiana, and Project Officer Colonel Lawrence P. Dupre, who directed the volunteer efforts of the Louisiana National Guardsmen, are also gratefully acknowledged for their assistance to the Survey.

NATIONAL EUTROPHICATION SURVEY
STUDY LAKES
STATE OF LOUISIANA

LAKE NAME	PARISH
Anacoco Lake	Vernon
Lake Bistineau	Bienville, Webster
Black Bayou	Caddo
Black Lake	Natchitoches and Red River
Bruin Lake	Tensas
Bundick Lake	Beauregard
Caddo Lake	Caddo (Marion and Harrison in Texas)
Cocodrie Lake	Concordia
Cocodrie Lake (Lower)	Rapides
Concordia Lake	Concordia
Cottle Lake	Rapides
Cross Lake	Caddo
D'Arbonne Lake	Union
False River Lake	Pointe Coupee
Indian Creek Reservoir	Rapides
Saline Lake	LaSalle
Turkey Creek Lake	Franklin
Lake Vernon	Vernon
Lake Verret	Assumption


Westfield
Bruslé
St Vincent
Pierre Part
Gheniers
Cleoxy
LAKE
VERRET
La.
Map Location
29°55'
29°50'
91°15'
91°10'
LAKE VERRET
Tributary Sampling Site
Lake Sampling Site
Sewage Treatment Facility
0 1 2 3 4 Km.
0 1 2 3 Mi.
Scale
Grassy
Lake

REPORT ON LAKE VERRET, LOUISIANA
STORET NO. 2216

I. INTRODUCTION

Lake Verret was included in the National Eutrophication Survey (NES) as a water body of interest to the Louisiana Stream Control Commission and the Louisiana Wild Life and Fisheries Commission. Tributaries and nutrient sources were not sampled, and this report relates only to the data obtained from lake sampling.

Lake Verret is located in Assumption Parish in southern Louisiana. The clayey soils surrounding the lake are on alluvial soils of the Mississippi River and are poorly drained swampland.

The lake is used extensively for fishing and other recreational activities. However, shoreline development is minimal, with only a few camps located on the south and west shores, and a large oil and gas field to the east (Shampine, 1971).

Pesticides from sugar cane spraying and fertilizer runoff entering the lake have been identified as a pollution problem in Lake Verret (Ketelle and Uttormark, 1971); Shampine (1971) states that some pollution from sugarmills along Bayou Lafourche and oil field wastes also reach the lake. The Louisiana Wild Life and Fisheries Commission (Michael Shurtz, personal communication) reports drainage from an extensive cypress-tupelo gum swamp which surrounds the lake is an additional nonpoint source of nutrients.

II. CONCLUSIONS

A. Trophic Condition:*

Survey data indicate that Lake Verret is eutrophic, i.e., nutrient rich and highly productive. Whether such nutrient enrichment is to be considered beneficial or deleterious is determined by its actual or potential impact upon designated beneficial water uses of the lake.

Of the 19 Louisiana lakes sampled in 1974, only 1 had higher median total phosphorus or median orthophosphorus values, and 9 had higher median inorganic nitrogen levels than Lake Verret. Chlorophyll *a* levels were extremely high, ranging from 3.0 µg/l in March to 197.9 µg/l in May, with a mean of 62.0 µg/l. Secchi disc visibility was very low.

Field limnologists reported seeing duckweed (*Lemna sp.*) and water hyacinths along 20% of the lake shoreline, and a heavy algae bloom was reported on the November sampling date.

B. Rate-Limiting Nutrient:

The algal assay results were not considered representative of conditions present in the lake at sampling times (03/21/74, 11/14/74) due to nutrient changes in the samples during shipment. The lake data indicate nitrogen limitation in Lake Verret on all four sampling occasions.

*See Appendix C.

III. LAKE CHARACTERISTICS

A. Lake Morphometry:*

A. Surface area: 56.98 km^2.
B. Mean depth: 1.5 meters.
C. Maximum depth:** 5.2 meters.
D. Volume: 86.833 x 10^6 m^3.

B. Precipitation:

A. Year of sampling: 142.8 cm.
B. Mean annual: 118.8 cm.

*Provided by the State of Louisiana.
**Shampine, 1971.

IV. LAKE WATER QUALITY SUMMARY

Lake Verrett was sampled four times during the open-water season of 1974 by means of a pontoon-equipped Huey helicopter. Each time, samples for physical and chemical parameters were collected from four stations on the lake (Station 02 was only sampled in March and August) and from one or more depths at each station (see map, page v). During each visit, depth integrated samples were collected from each station for chlorophyll a analysis and phytoplankton identification and enumeration. During the first and last visits, 18.5-liter depth-integrated samples were composited for algal assays. Maximum depths sampled were 7.2 meters at Station 01, 0.6 meters at Station 02, 1.5 meters at Station 03, and 1.8 meters at Station 04. For a more detailed explanation of NES methods, see NES Working Paper No. 175.

The results obtained are presented in full in Appendix B and are summarized in IV-A for waters at the surface and at the maximum depth for each site. Results of the phytoplankton counts and chlorophyll a determinations are included in IV-B. Results of the limiting nutrient study are presented in IV-C.

[redacted]

[illegible]

[illegible]

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]						
[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

B. Biological Characteristics:

1. Phytoplankton -

Sampling Date	Dominant Genera	Algal Units per ml
03/21/74	1. Pennate diatom	4,641
	2. Flagellates	1,904
	3. Ankistrodesmus	1,099
	4. Scenedesmus	679
	5. Lyngbya	366
	Other genera	673
	Total	9,412
06/29/7	1. Oscillatoria	93,324
	2. Dactylococcopsis	17,742
	3. Anabaenopsis	4,436
	4. Nitzschia	3,263
	5. Ankistrodesmus	2,306
	Other genera	13,129
	Total	134,220
08/21/74	1. Oscillatoria	88,499
	2. Lyngbya	20,336
	3. Raphidiopsis	9,600
	4. Anabaenopsis	4,807
	5. Centric diatom	3,091
	Other genera	19,196
	Total	125,608

F. Chlorophyll a

Sampling Date	Station Number	Chlorophyll a (ug/l)
03/21/74	01	3.0
	02	11.6
	03	13.3
	04	15.8
05/29/74	01	21.2
	02	--
	03	25.8
	04	197.9
08/21/74	01	42.7
	02	117.2
	03	131.9
	04	76.7
11/14/74	01	59.8
	02	--
	03	45.3
	04	58.7

C. Limiting Nutrient Study:

The assay algal results are not considered representative of conditions present in the lake at the time the samples were taken (03/21/74, 11/14/74) due to significant changes in nutrient concentrations in the samples during shipment and pre-assay storage. However, inorganic nitrogen to orthophosphorus ratios (N/P) in the lake data were 3/1 or less on all sampling occasions, indicating Lake Verret to be nitrogen limited. (An N/P ratio of 14/1 or greater is generally considered necessary for phosphorus limitation to occur). The low N/P ratios are a result of excessively high orthophosphorus levels in the lake.

V. LITERATURE REVIEWED

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Schurtz, Michael H. 1977. Personal Communication (Water Quality of Lake Verret). Louisiana Wild Life and Fisheries Commission, Division of Water Pollution Control, Baton Rouge, Louisiana.

Thampine, W. J. 1971. Chemical, Biological and Physical Data for the Major Lakes and Reservoirs in Louisiana. Louisiana Department of Public Works, #6. Baton Rouge, Louisiana.

U.S. Environmental Protection Agency. 1974. National Eutrophication Survey Methods 1971-1976. Working Paper No. 175. National Environmental Research Center, Las Vegas, Nevada, and Pacific Northwest Environmental Research Laboratory, Corvallis, Oregon.

VI. APPENDICES

APPENDIX A
CONVERSION FACTORS

CONVERSION FACTORS

Hectares x 2.471 = acres

Kilometers x 0.6214 = miles

Meters x 3.281 = feet

Cubic meters x 8.107 x 10^{-4} = acre/feet

Square kilometers x 0.3861 = square miles

Cubic meters/sec x 35.315 = cubic feet/sec

Centimeters x 0.3937 = inches

Kilograms x 2.205 = pounds

Kilograms/square kilometer x 5.711 = lbs/square mile

APPENDIX B

PHYSICAL AND CHEMICAL DATA

[illegible]

[illegible]

[illegible]

APPENDIX C

PARAMETRIC RANKINGS OF LAKES SAMPLED BY NES IN 1974

STATE OF LOUISIANA

LAKE DATA TO BE USED IN REPORT

LAKE CODE	LAKE NAME	[illegible] TOTAL P	[illegible] TOTAL N	[illegible] AREA SQ	[illegible] DEPTH	[illegible] ORG SU	[illegible] LOSS (METHOD 2)
0201	[illegible] LAKE	1.411	0.241	495,433	6.781	13,449	0.397
0202	[illegible] LAKE	1.457	1.251	491,331	24.754	75,851	0.712
0203	LAKE [illegible]	1.791	1.239	494,381	12.443	13,289	0.819
0204	[illegible]	1.746	0.342	493,417	17.419	12,499	0.746
0205	[illegible] LAKE	1.257	1.135	491,897	21.467	15,669	0.673
0207	[illegible] LAKE	1.987	1.401	479,631	25.381	7,781	0.829
0208	[illegible] LAKE	1.437	1.179	492,633	12.458	14,263	0.811
0209	[illegible] LAKE	1.774	1.391	498,333	31.456	74,898	0.839
0210	[illegible] LAKE	1.457	1.394	479,259	38.361	11,449	0.819
0211	[illegible] LAKE	1.738	1.239	494,256	9.459	13,298	0.811
0214	[illegible] LAKE	1.797	1.136	492,388	24.551	14,489	0.823
0215	[illegible]	1.731	1.251	494,333	21.467	14,899	0.819
0216	[illegible] LAKE	1.711	1.352	493,889	15.332	9,668	0.825
0217	[illegible] LAKE	1.176	1.171	477,833	21.967	14,998	1.372
0218	LAKE [illegible]	1.263	1.191	491,429	62.429	12,695	0.854
0219	LAKE [illegible]	1.419	1.225	495,667	4.488	14,468	0.887
0220	[illegible] LAKE	1.977	1.251	494,225	12.732	13,988	0.826
0221	[illegible]	1.126	1.256	479,333	36.433	13,899	0.834
0407	[illegible] LAKE	1.964	1.171	483,367	2.125	15,288	0.789

| | | |